Introduction to fungal succession

Kevin D. Hyde[1*] and E.B.G. Jones[2]

[1]Centre for Research in Fungal Diversity, Department of Ecology & Biodiversity, The University of Hong Kong, Pokfulam Road, Hong Kong SAR
[2]National Center for Genetic Engineering and Biotechnology, 113 Paholyothin Road, Klong 1, Klong Luang, Pathumthani, Thailand 12120

Hyde, K.D. and Jones, E.B.G. (2002). Introduction to fungal succession. In: *Fungal Succession* (eds. K.D. Hyde and E.B.G. Jones). Fungal Diversity 10: 1-4.

This volume of Fungal Diversity is devoted to fungal succession. The term fungal succession is used loosely throughout the volume. A precise definition of fungal succession is "the sequential occupation of the same site by thalli (usually mycelia)", but the term can be used more loosely to refer to "the sequential occurrence of fungal fruiting bodies on substrata as it decays". This volume brings together various studies on fungal succession including the traditionally studied macrofungi and the less well-studied microfungi. In this way we have brought together much of the data available on fungal succession. The final paper in this volume discusses the problems associated with studying fungal succession, especially in microfungi, and discusses possible methods to overcome these problems.

Key words: macrofungi, microfungi, sequential occurrence.

Introduction

Fungal succession has been defined "as the sequential occupation of the same site by thalli (usually mycelia) either of different fungi or of different associations of fungi" (Rayner and Todd, 1979) who placed importance on the occupation of sites by mycelium. Fungal succession has also been referred to as "a sequence of fungi sporulating on a substrate". This definition cannot be regarded as fungal succession in a strict sense as it does not necessarily involve replacement of one fungal taxon by another and may purely be affected by the time it takes for each fungus to sporulate on a substrate. The subject of fungal succession has been reviewed by Frankland (1992, 1998) and in this volume Fryar (2002) suggests that to avoid confusion, fungal succession may be better termed "mycelial succession" to emphasise the importance of observing changes in mycelial distribution. In addition, the term "sequence of fungal sporulation" should be used rather than the term "fruit body succession" to provide further clarification in describing these processes. The term fungal

* Corresponding author: Kevin D. Hyde; email: kdhyde@hkucc.hku.hk

succession is, however, used loosely throughout this volume and may refer to a strict succession or a sequence of fungal sporulation.

The volume includes 16 papers dealing with various aspects of fungal succession. In the first paper, Fryar (2002) provides an overview of succession and a discussion of various aspects of fungal succession, while Susuki (2002) examines succession at the macro- and micro-scales. Macrofungal succession has been well-studied and is dealt with in two papers in this volume. McMullan-Fisher *et al.* (2002) provide data on the changes in the occurrence of macrofungi with time following forestry activities and fire at 14 sites in Mountain Ash (*Eucalyptus regnans*) dominated forests in Australia. Data on the sequential appearance of ammonia fungi after urea treatment is provided by Susuki *et al.* (2002). The results indicate that successive occurrence of ammonia fungi in the field results from a combination of sequential propagation (colonisation) and the time needed for each fungus to produce reproductive structures.

The volume includes 11 papers presenting studies on succession of microfungi on various decaying substrata. Richardson (2002) reviews the literature on dung fungi and presents new data from observations made on samples collected for a study of the occurrence and diversity of coprophilous fungi. Succession of fungi on dung is understood to be a sequence of observation of fungi, as identified by their fruiting, rather than an understanding the sequential replacement of one organism by another. Tokumasu and Aoiki (2002) present a novel approach for studying microfungal succession on decaying pine needles in Japan. Three succession stages were recognized and characteristic species of each stage are demonstrated. Three papers deal with the sequence of fungal sporulation on submerged wood in temperate and tropical regions (Ho *et al.*, 2002; Kane *et* al., 2002; Sivichai *et al.*, 2002) and highlights the differences in fungal diversity between geographical locations Four papers report on the sequence of fungal sporulation in tropical forests: one paper deals with decaying seeds of *Delonix regia* in Thailand (Somrithipol *et al.*, 2002); one on decaying fronds of the palm *Phoenix hanceana* in Hong Kong (Yanna *et al.*, 2002), Zhou and Hyde (2002) provide data on bamboo, while Promputtha *et al.* (2002) consider fungal succession on senescent leaves of *Manglietia garrettii* in northern Thailand. In all of these studies a sequence of fungal sporulation was observed and again underlines the great differences in the diversity of taxa observed. Panebianco *et al.* (2002) addresses the parameters that may affect fungal succession of marine fungi under experimental conditions in the field. Finally, Zhou *et al.* (2002) provide results on the infection sequence and pathogenicity of *Ophiostoma ips*, *Leptographium serpens* and *L. lundbergii* to pines in South Africa.

The final paper in this volume discusses some of the problems associated with studies of fungal succession, particularly with microfungi and proposes ways in which these problems could possibly be addressed. Compilation of this volume on fungal succession provides one location where much information on fungal succession, from diverse substrata, habitats and geographical locations, can be referenced and will hopefully stimulate future studies.

References

Frankland, J.C. (1992). Mechanisms in fungal succession. In: *The Fungal Community: Its Organization and Role in the Ecosystem* (eds. D.T. Wicklow and G.C. Carroll). 2nd edn. Marcel Dekker Press, New York: 403-426.

Frankland, J.C. (1998). Residential Address: fungal succession – unraveling the unpredictable. Mycological Research 102: 1-15.

Fryar, S.C. (2002). Fungal succession or sequence of fruit bodies? In: *Fungal Succession* (eds. K.D. Hyde and E.B.G. Jones). Fungal Diversity 10: 5-10.

Ho, W.H., Yanna, Hyde, K.D. and Hodgkiss, I.J. (2002). Seasonality and sequential occurrence of fungi on wood submerged in Tai Po Kau Forest Stream, Hong Kong. In: *Fungal Succession* (eds. K.D. Hyde and E.B.G. Jones). Fungal Diversity 10: 21-43.

Kane, D.F., Tam, W.Y. and Jones, E.B.G. (2002). Fungi colonising and sporulating on submerged wood in the River Severn, UK. In: *Fungal Succession* (eds. K.D. Hyde and E.B.G. Jones). Fungal Diversity 10: 45-55.

McMullan-Fisher, S.J.M., May, T.W. and Keane, P.J. (2002). The macrofungal community and fire in a Mountain Ash forest in southern Australia. In: *Fungal Succession* (eds. K.D. Hyde and E.B.G. Jones). Fungal Diversity 10: 57-76.

Panebianco, C., Tam, W.Y. and Jones, E.B.G. (2002). The effect of pre-inoculation of balsa wood by selected marine fungi and their effect on subsequent colonisation in the sea. In: *Fungal Succession* (eds. K.D. Hyde and E.B.G. Jones). Fungal Diversity 10: 77-88.

Promputtha, I., Lumyong, S., Lumyong, P., McKenzie, E.H.C. and Hyde, K.D. (2002). Fungal succession on senescent leaves of *Manglietia garrettii* in Doi Suthep-Pui National Park, northern Thailand. In: *Fungal Succession* (eds. K.D. Hyde and E.B.G. Jones). Fungal Diversity 10: 89-100.

Rayner, A.D.M. and Todd, N.K. (1979). Population and community structure and dynamics of fungi in decaying wood. Advances in Botanical Research 7: 334-420.

Richardson, M.J. (2002). The coprophilous succession. In: *Fungal Succession* (eds. K.D. Hyde and E.B.G. Jones). Fungal Diversity 10: 101-111.

Sivichai, S., Jones, E.B.G. and Hywel-Jones, N. (2002). Fungal colonisation of wood in a freshwater stream at Tad Ta Phu, Khao Yai National Park, Thailand. In: *Fungal Succession* (eds. K.D. Hyde and E.B.G. Jones). Fungal Diversity 10: 112-128.

Somrithipol, S., Jones, E.B.G. and Hywel-Jones, N.L. (2002). Fungal diversity and succession on pods of *Delonix regia* (*Leguminosae*) exposed in a tropical forest in Thailand. In: *Fungal Succession* (eds. K.D. Hyde and E.B.G. Jones). Fungal Diversity 10: 129-137.

Suzuki, A. (2002). Fungal succession at different scales. In: *Fungal Succession* (eds. K.D. Hyde and E.B.G. Jones). Fungal Diversity 10: 11-20.

Suzuki, A., Uchida, M. and Kita, Y. (2002). Experimental analyses of successive occurrence of ammonia fungi in the field. In: *Fungal Succession* (eds. K.D. Hyde and E.B.G. Jones). Fungal Diversity 10: 139-163.

Tokumasu, S. and Aoiki, T. (2002). A new approach to studying microfungal succession on decaying pine needles in an oceanic subtropical region in Japan. In: *Fungal Succession* (eds. K.D. Hyde and E.B.G. Jones). Fungal Diversity 10: 165-181.

Yanna, Ho, W.H. and Hyde, K.D. (2002). Fungal succession on fronds of *Phoenix hanceana* in Hong Kong. In: *Fungal Succession* (eds. K.D. Hyde and E.B.G. Jones). Fungal Diversity 10: 183-209.

Zhou, D.Q. and Hyde, K.D. (2002). Fungal succession on bamboo in Hong Kong. In: *Fungal Succession* (eds. K.D. Hyde and E.B.G. Jones). Fungal Diversity 10: 211-225.

Zhou, X.D., De Beer, W., Wingfield, B.D. and Wingfield, M.J. (2002). Infection sequence and pathogenicity of *Ophiostoma ips*, *Leptographium serpens* and *L. lundbergii* to pines in South Africa. In: *Fungal Succession* (eds. K.D. Hyde and E.B.G. Jones). Fungal Diversity 10: 227-238.

(Received 21 May 2002; accepted 1 June 2002)